

REMARKS

In order to advance the prosecution of this application and to clarify the claimed invention, Applicants are canceling Claims 29-38 and adding new Claims 39-49.

Support for the features of the new claims is shown in the specification and drawings of the present application, such as for example:

Claim 39 - see e.g. page 13, lines 14-16; page 14, lines 13-14; and page 16, lines 8-10;

Claim 41 - see e.g. page 13, lines 13-15; and Fig. 1;

Claim 42 - see e.g. page 16, line 14 - page 17 line 7; and Table 1 on page 22;

Claim 48 - see e.g. Fig.1.

As explained below, Claims 39-49 are in an allowable condition and distinguishable over the prior art. Accordingly, it is respectfully requested that these new claims be entered and allowed.

Applicants will now address the Examiner's rejections in the Office Action.

Claim Rejections - 35 USC §112

In the Office Action, the Examiner rejects Claims 29-38 under 35 USC §112, second paragraph, as being indefinite. In particular, the Examiner objects to the definition of "t" in the formula in the claims. This rejection is respectfully traversed.

While Applicants traverse this rejection, Claims 29-38 have been canceled, and the definition of "t" in the formula in new Claims 39-49 has been corrected. Accordingly, it is respectfully submitted that this rejection has been overcome, and it is requested that the rejection be withdrawn.

Claim Rejections - 35 USC §103

The Examiner also has the following rejections under 35 USC §103(a):

- A. Claims 29, 30 and 35 are rejected as being unpatentable over Kim et al. ("Attenuated phase-shifting masks of chromium aluminum oxide", Applied Optics, Vol. 32, No. 19, July 1, 1998) in view of Ballentine et al. (US 5,248,402) and Robison et al. (US 3,718,572).
- B. Claims 31-33 are rejected as being unpatentable over Kim et al. in view of Ballentine et al. and Robison et al. and further in view of Gogh et al. (US 6,620,296).
- C. Claim 34 is rejected as being unpatentable over Kim et al. in view of Ballentine et al. and Robison et al. and further in view of Katsura et al. (US 4,933,063).
- D. Claim 36 is rejected as being unpatentable over Kim et al. in view of Ballentine et al. and Robison et al. and further in view of Mintz et al. (US 6,162,297).
- E. Claims 30 and 37 are rejected as being unpatentable over Kim et al. in view of Ballentine et al. and Robison et al. and further in view of Mostovoy et al. (US 6,428,663).
- F. Claim 38 is rejected as being unpatentable over Kim et al. in view of Ballentine et al. and Robison et al. and further in view of Fujikawa et al. (01-173718).

While Applicants traverse these rejections, in order to advance the prosecution of this application, Claims 29-38 have been canceled, and new Claims 39-49 are being filed herewith. As explained below, these new claims are patentable over these references.

More specifically, the prior claims are rejected as being obvious over the combination of Kim, Ballantine, and Robison (and other tertiary references).

Initially, it is noted that new independent Claim 39 has been drafted to include the feature that the shield has a shape so that a sputtering film formation rate for a position on the shield is not larger than a film formation rate for a position on the substrate. Hence, the shield according to the claimed invention is designed so that the film formation rate on a point on the shield cannot be larger than the film formation rate on a point on the substrate.

In the rejection of the claims, the Examiner contends that "...Robison et al. teach in Figs. 1

and 2 a shield 17 that has a shape such that a position on the shield in the vicinity of the target and the target is sufficiently long distance so as to prevent a relative film formation speed on the shield from being larger than that on the substrate.” The Examiner also annotated an enlarged portion of Fig. 3 in Robison to help explain his position, which Applicants appreciate.

However, the film formation speed for each of the positions on the shield and on the substrate cannot be determined without knowing the value of “r” (in the claimed formula (i)) for each position. Hence, even if the distance value “r” between the point on the shield and the center of the target (which the Examiner contends is “r” in his drawing of Robison Fig. 3 in the Office Action) is determined, another “r” value, which is the distance between the point on the substrate and the center of the target, is unknown in Fig. 3 of Robison. In fact, Fig. 3 of Robison does not even appear to show the substrate.¹ Further, according to Robison, there is no way to determine and compare the film formation speed of each of the positions on the shield and on the substrate. Even in Fig. 1 of Robison, which shows the substrate, there is still no way to calculate the value of “r” in the claimed formula (i) without precisely knowing the value “r”, the distance between the center of the target and the position on the shield (for example, the end point of the shield) as well as the distance between the center of the target and the position on the substrate (for example, the end point of the substrate). Hence, Robison does not disclose or suggest this claimed feature of Claim 39.

In addition, a close look at the disclosure in Robison reveals that one skilled in the art would not be led to the claimed invention from Robison. Specifically, Robison raises a problem in the sputtering process caused by various kinds of undesirable contaminants, such as water or air particles (which result from leaks in the enclosure seals), oil or dust (which are brought in by the water and air), “Out-gas” (which may result from the release of absorbed gas), and contaminants which are

¹ Further, since the figures in Robison are not precise in scale but are only schematics for showing

brought in by the rotating mechanism, as well as contaminants due to cathode assembly. See e.g. Cols. 1 and 2 in Robison. Robison, however, is completely silent as to any potential problem with particles caused by a sputtering film which has been peeled off. Therefore, there is absolutely no motivation in Robison to be concerned about the film formation on the shield, and even less motivation to be concerned as to the speed of this as compared with that on the substrate.

Furthermore, the new claims recite that the shield has a rounded shape with no corner. By rounding instead of having a corner, as is explained in the specification, the claimed invention effectively avoids peeling off of the film formed on the shield. In contrast, Robison's shield has a corner, which clearly, is not rounded. The film formed on such a corner tends to peel off due to the stress at the corner. Hence, there is no disclosure in Robison of this claimed feature. It is not surprising that the apparatus in Robison does not have the claimed feature since the reference expresses no concern about undesirable film formation on the shield and peeling off to make particles.

For at least the above-stated reasons, the features of the new independent Claim 39 that the sputtering film formation rate for a position on the shield is not larger than a film formation rate for a position on the substrate and that the shield is rounded with no corners are not disclosed or suggested in Robison. Further, there is no other cited reference that discloses or suggests these features of the claimed invention.

In contrast to the prior art, the apparatus of the claimed invention required extra care in designing the shape of the shield to prevent the undesired generation of particles which is the potential risk for making undesired particles. These features have a remarkable significance in the manufacturing of photo masks for extreme short wavelength exposure light.

the structural features, the value of angle θ , even if measured on the figures, is not that meaningful.

Therefore, as none of the cited references disclose or suggest the apparatus of independent Claim 39, independent Claim 39 and those claims dependent are patentable over the cited references. Accordingly, it is respectfully requested that these rejections be withdrawn, and the new claims be allowed over the art.

Conclusion

It is respectfully submitted that the present application is in a condition for allowance and should be allowed.

If any fee is due for this amendment, please charge our deposit account 50/1039.

Favorable reconsideration is earnestly solicited.

Respectfully submitted,

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